

Quiz 7

Name: Key

Math 115, Fall 2016

Thursday Discussion Time: _____

Directions: You have 20 minutes to complete this quiz. Read each problem carefully. There are three problems on the back of this page. Please put a box around your answers. No calculators are allowed.

1. (2 points)

Find all of the zeros, both real and non-real, of the following polynomial.

$$p(x) = x^3 + 2x$$

$$x^3 + 2x = x(x^2 + 2) = 0$$

zeros:

$$x=0, x=\sqrt{2}i, x=-\sqrt{2}i$$

2. (2 points)

The polynomial $f(x) = x^3 - 2x^2 + x - 2$ has $x = 2$ as a zero. Use this fact to factor this polynomial as a product of linear and irreducible real polynomials.

$$x^3 - 2x^2 + x - 2 = x^2(x-2) + (x-2) = \boxed{(x-2)(x^2+1)}$$

Note that x^2+1 is irreducible since its discriminant equals

$$0^2 - 4(1)(1) = -4.$$

3. (2 points)

Determine the polynomial $p(x)$ of degree 4 that has all of the following properties. Leave your answer in factored form.

- zeros of $x = 0, x = -1, x = 3$

- multiplicity of $x = 0$ is 1

- multiplicity of $x = -1$ is 1

- $p(4) = 40$

$$p(x) = a(x)(x+1)(x-3)^2$$

$$p(4) = 40 \Rightarrow 40 = a(4)(4+1)(4-3)^2 = 20a$$

$$\Rightarrow a = 2$$

$$p(x) = 2x(x+1)(x-3)^2$$

4. (2 points)

$$\text{Let } f(x) = \frac{x^3 + 3x^2 + 12}{x^2 - 3x + 2}.$$

(a) Determine all of the vertical asymptotes.

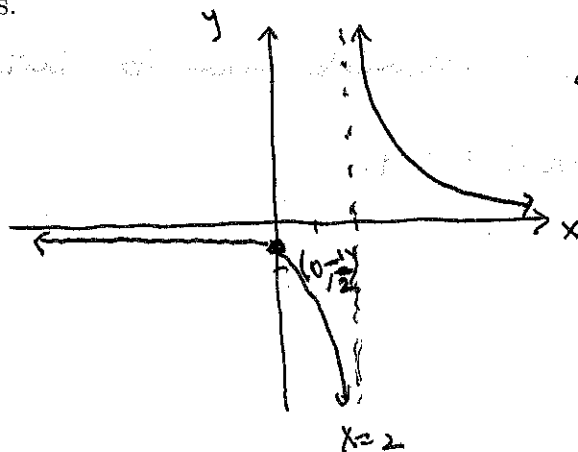
$$x^2 - 3x + 2 = 0 \Rightarrow (x-2)(x-1) = 0 \Rightarrow \text{vertical asymptotes: } x=2, x=1$$

(b) Determine the horizontal asymptote

Since degree (numerator) = degree (denominator) the horizontal asymptote is: $y = 3$

5. (2 points)

Sketch the graph of the function $g(x) = \frac{1}{x-2}$. Indicate any vertical and horizontal asymptotes and all intercepts.



- No x-intercepts

- $y=0$ is the horizontal asymptote